Stream Conservation

DNR

Protecting Your Streams: Choices for Conservation

You Can Help Protect Streams

We can all help protect rivers and streams in our community by learning about the problems that affect them and possible solutions to those problems. This booklet describes how the important choices we make to manage and develop our property affect our streams. (These choices also affect our lakes and other water bodies.)

If you own or manage property -- a home and yard, automobiles, pets or livestock, industrial or commercial land, buildings and parking lots, forestland, farmland, or undeveloped land -- then these choices may apply to you.

The conservation choices presented on the following pages are arranged by the following themes:

- **Polluted runoff:** We all contribute to pollution. Learn how you contribute and clean up your actions.
- **Stormwater flow:** High volumes of runoff destroy streams and property. Capture runoff on your land and let the water soak in.
- **Better building:** Too much pavement causes polluted runoff and stormwater flow problems. When building, keep more areas natural and pave less.
- **Stream-side buffers:** As natural areas along streams, buffers will benefit wildlife, water quality, and you. Protect buffers on all streams.
- **Habitat connections:** Better wildlife habitat requires conservation of large natural areas. Use stream-side buffers to expand and connect habitats throughout your county.

Ribbons of Life

by Bill Marshall, SCDNR

South Carolina has 30,000 miles of streams that flow through our cities, towns, and neighborhoods. For many of us, childhood memories include the adventures of fishing, wading, or swimming in a nearby creek; and early encounters with wild creatures and nature's beauty occurred while exploring the margins of a stream.

Edisto River. (Photo by Ted Borg)

Rich in wildlife. A wide variety of fish and wildlife is found in these special places where land and water meet. Many animals depend upon these areas for their survival. Fish, salamanders, frogs, crayfish, turtles, snakes, otters, ducks, and other creatures may spend all or most of their lives in the water. Other animals like raccoons, mink, deer, song birds, owls, and hawks may use the areas at the edges of streams for food, water, and shelter.

In many places, the best remnants of intact wildlife habitat may be found along our rivers and streams because these areas are often spared from clearing and development thanks to wet soils, flooding, or steep slopes. This is true around cities where much of the land is used for houses, yards, buildings, parking lots, and roads. In rural places where farm fields occupy most of the upland areas, the habitats along streams, particularly the floodplains, provide large refuges for wildlife.

Even in areas that are wild and undeveloped, stream-side habitats are special places. Where the land is completely forested, wildlife biologists consider stream-side habitats to be among the most important because they support a great variety and abundance of plants and animals, including many rare and sensitive species.

When seen from an airplane, the natural areas along the banks and floodplains of rivers and streams often appear as corridors. These ribbons of natural habitat, winding through an otherwise developed or cleared landscape, provide shelter and travel corridors necessary for many species of wildlife.

Essential to good water quality. The improvement of water quality is another benefit provided by these ribbons of habitat along streams. Stream-side habitats help trap and remove pollutants from runoff. Polluted runoff (or non-point source pollution) is rainwater that has washed pollutants from land surfaces into nearby streams, lakes, and other water bodies.

(continued on pg 3)

Reduce Polluted Runoff:

Do Your Actions Help or Harm Water Quality?

What is polluted runoff? It is the water flowing across streets, parking lots, and fields that picks up oil, grease, trash, dirt, animal wastes, and other stuff left behind by people, automobiles, and animals. This washwater from pavements typically flows to stormdrains and is piped into a nearby stream. From construction sites, farm fields, or timberlands, the rain may carry a flow of mud and sediment to a stream. From golf courses, agricultural fields, home lawns, and gardens, the rain (or irrigation water) may wash fertilizers and pesticides to a stream. Septic tanks that are poorly designed or managed may contribute sewage to runoff. Polluted runoff can be reduced if we all choose to do our part.

Urban or suburban residents can do the following:

- **Properly dispose of pet and animal wastes.** Clean up pet waste from your yard (and from public streets and parks while walking pets). Dispose of wastes in the toilet or trash, or bury them.
- **Do not use storm drains for disposal.** Keep animal wastes, litter, and debris out of street gutters and storm drains. These drains typically flow directly to streams, rivers, ponds, and lakes.
- **Apply lawn and garden chemicals sparingly or not at all.** Read and follow directions for applying pesticides and fertilizers. Use only what is really needed. Do not apply them if rain is expected. Ask a Clemson Extension Service Agent about environmentally-friendly alternatives to lawn and garden chemicals.
- **Properly dispose of oil and household chemicals.** Dispose of used oil, antifreeze, paints, and other household chemicals at recycling centers or service stations. Do not dump on the ground or down a drain. S.C. Department of Health and Environmental Control (DHEC) or local governments can direct you to places that collect household hazardous wastes.
- **Repair leaking vehicles.** Repair automobile leaks and cleanup spilled brake fluid, oil, grease, and antifreeze. Do not hose leaks into the street where they can eventually reach local streams and lakes.
- **Inspect septic tank systems annually, and pump them out regularly.**
- **Control soil erosion on your property.** Plant ground cover, shrubs, and trees to control erosion and stabilize erosion-prone areas.
- **Seek better laws and enforcement.** Encourage local government officials to develop, improve, and enforce rules to control erosion and sediment from construction sites in your community. Report erosion problems to your local government.

Landowners can do the following:

- **Follow best management practices to protect water, soil, and wildlife.** Forestry guidelines are published by the S.C. Forestry Commission in their book, South Carolina's Best Management Practices for Forestry. Guidelines for agriculture are published by the S.C. Department of Natural Resources (DNR) and the U.S.D.A. Natural Resources Conservation Service (NRCS) in their book, Farming for Clean Water in South Carolina: a Handbook of Conservation Practices.
- **Establish stream-side buffers on all streams.** Buffers from 40 to 100 feet wide along all streams are recommended.
- **Report questionable logging practices.** Contact the S.C. Forestry Commission and DHEC if you think a logging operation is causing water quality problems.
- **Control animals and their wastes.** Fence animals away from streams. Manage animal waste to minimize contamination of surface water and groundwater.
- **Apply pesticides and fertilizers sparingly or not at all.**

Everyone can participate in river cleanup efforts:

- **Pick up trash and don't litter.** Huge amounts of trash and litter are washed from streets, parking lots, and ditches into rivers and streams. Much of the junk and trash found in streams is deliberately dumped or carelessly discarded. Your help is needed to cleanup the trash.
- **Get involved with Beach Sweep / River Sweep.** You and your group can help cleanup the trash by contacting the DNR and S.C. Sea Grant Consortium for more information. Contact the DNR at (803) 734-9100.

Pet and animal wastes, automobile fluids, lawn and garden chemicals, litter and trash -- these are the common sources of pollutants in runoff from urban/suburban areas. Rainwater washes pollutants from pavements and lawns to storm drains that pipe polluted runoff to nearby streams. (Graphic from University of Wisconsin Extension and Wisconsin DNR)

Control Stormwater Flow:

Capture Runoff and Let the Water Soak In

When it rains or storms, truck-loads of water can quickly fall onto and flow from a developed site where buildings and parking lots cover the ground. If left uncontrolled, this torrent of water can rush into nearby streams and cause damage to downstream properties -- including erosion of stream banks and channels, flooding, and sedimentation. These heavy water loads also wash pollutants such as oils, chemicals, animal wastes, and sediment off the site and directly into streams.

Natural controls. Before a site is paved and developed, natural stormwater controls are usually in place. On a natural site, one that is fully vegetated with trees, shrubs, or grass, most of the stormwater soaks into the soil where it will drain slowly to a nearby creek, into deep groundwater, or is taken-up by trees and shrubs. The soil and vegetation on a natural site serve to store (soak-up) stormwater, filter it, and slowly release it to the stream.

Engineered controls. These days, most new developments are required to replace some of the natural stormwater controls, mentioned above, with engineered controls that delay, capture, store, infiltrate, and sometimes treat stormwater. A standard engineered control is the stormwater basin (detention or retention pond) designed to capture runoff from developed areas, slowly release it to a stream, or allow ground infiltration. In some cases, stormwater basins are designed as rain gardens or wetlands with water-adapted plants. In a vegetated condition, these basins can provide the added service of filtering the stormwater before it enters the stream.

Property owners can help control stormwater flow by doing the following:

- **Reduce the area of impervious surface.** Pave and build over less area. Keep as much area in natural open space as possible. Use pervious (porous) surface material where possible. For example, use gravel instead of asphalt for driveways and parking lots.

- **Practice stormwater management on your property.** Disperse stormwater into permeable areas such as lawns, grass swales, rain gardens, or basins to maximize on-site infiltration and minimize runoff from your site. Properties with large areas of impervious surface should establish stormwater basins to store runoff, allow pollutants to settle out, and slowly release the water to streams. (Consider techniques of "Low Impact Development" – see contacts and information resources)

Kayaker, Bill Stokes, regularly collects dozens of balls (a prized catch of trash and litter) on outings to the Catawba River near Landsford Canal. The balls are carried by stormwater down from Charlotte, NC. Stokes repairs the balls and gives them to schools and needy children. (Photo by Layne Bailey, the Charlotte Observer)

Stormwater runoff. (Photo by Dave Hargett)

Ribbons of Life (continued from pg 1)

After several decades of cleaning up point-source pollution from pipe discharges, more than half of the remaining water pollution in the United States now comes from polluted runoff. It is the most common source of water pollution affecting streams in South Carolina. Besides affecting fish and wildlife, this pollution contaminates our drinking water sources and spoils recreational uses like swimming, fishing, and boating.

Threats. Because of expanding human development, the threats to streams and stream-side habitats are increasing. Some portions of South Carolina are being built or paved over at a rate five to six times their population growth. Sadly, our typical approach to development involves clearing, grading, filling, paving, and building so as to consume rather than conserve the natural landscape. Most of us don't realize that we are part of the problem. We saturate our lawns with chemicals or allow our cars to leak oil with little or no consideration given to the effects of these actions on our streams, lakes, and groundwater.

What do you think? Does clearing that acre of trees down by the creek really matter? Can a little extra fertilizer on the lawn and my leaky transmission really hurt anything?

Make your mark. Our individual choices do make a difference, especially when they are added to similar choices made by our neighbors and fellow citizens. Each of us can choose to make a positive difference in protecting our streams, related waters, and wildlife, so consider the ways you can help.

Building Better:

More Natural Area, Less Pavement

When we build, we create "impervious cover." Paved roads, parking lots, sidewalks, rooftops, and other hard surfaces that cover the ground are impervious to water, so rainfall in these areas cannot soak into the soil and filter slowly to a stream. Instead, we cause stream degradation from polluted runoff and stormwater flow (addressed above), which are a direct result of impervious cover. The greater the areas of imperviousness, the worse the problems become, and, unfortunately, impervious cover is on the increase.

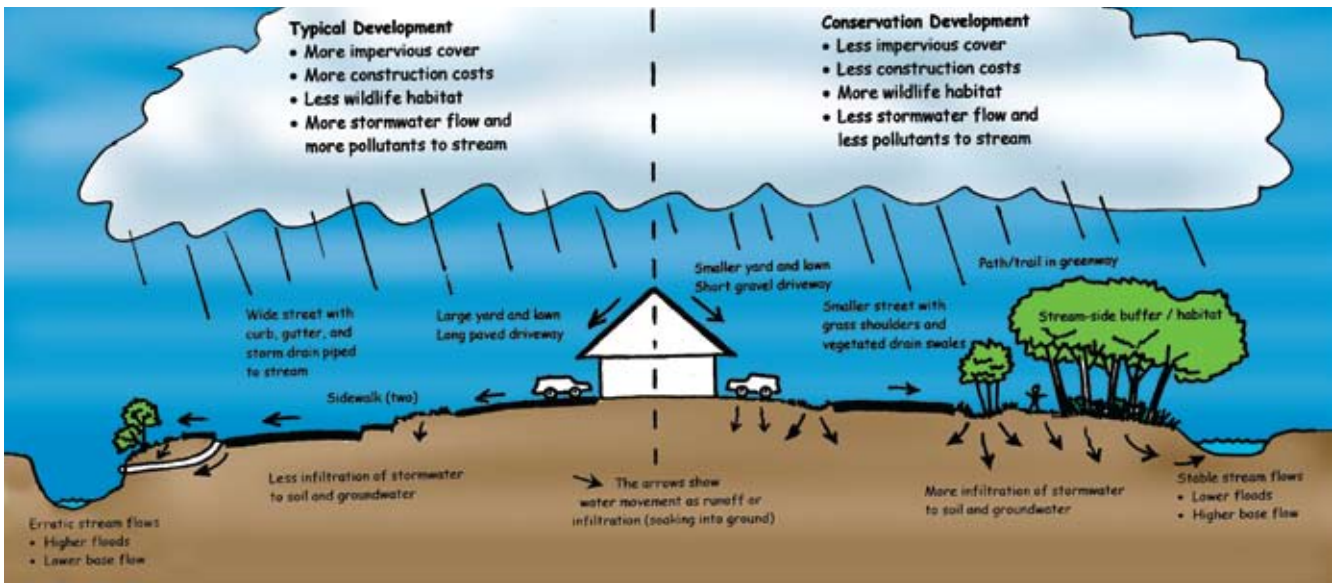
Pavement rules. Our approach to development in recent decades has resulted in increasingly more built-up and paved-over surface area per person. State and local rules and regulations for development often require wide streets, long driveways, expansive parking lots, and large-lot subdivisions that create needless impervious cover and crowd out natural areas and open spaces. We need to change these development rules and reverse this trend. We need to develop in ways that are more compact and conserve more natural space.

Greener and cleaner alternatives. Site planners have the opportunity to reduce stormwater flow and polluted runoff to streams by changing the way they lay out new developments. By employing open-space design techniques, planners can reduce the amount of impervious cover, increase the amount of natural land conserved, and improve the performance of stormwater treatment systems. Open space designs concentrate development on one portion of a site in order to conserve open space elsewhere on site. This alternative design approach, sometimes referred to as "conservation design," is accomplished by allowing flexibility with the lot sizes, frontages, road sections, and other subdivision geometry. For stormwater management on individual lots, the design techniques known as "Low Impact Development" (LID) are effective.

Open space/conservation design techniques. By using the following design techniques that reduce impervious cover and increase natural open space, new residential areas will reduce impacts to streams from stormwater flow and polluted runoff (and they will be more desirable places to live).

Aerial view of typical development shows the heavy application of roads and loss of natural areas.

- **Use narrow, short streets and rights-of-way.**
- **Apply smaller lots and setbacks and narrow frontages to preserve significant open space.**
- **Reduce the amount of site area devoted to residential lawns and more to natural open space.**
- **Spread stormwater runoff over pervious surfaces.**
- **Use grass swales rather than curbs and gutters.**
- **Protect stream-side buffers.**



Conservation design techniques for residential development: Use narrow streets and rights-of-way and apply small lots and setbacks to preserve open space. Devote less area to residential lawns and more to natural areas. Spread stormwater runoff over pervious surfaces. Use vegetated channels or swales rather than curbs and gutters. Protect stream-side buffers. (Graphic by Bill Marshall)

Create Stream-side Buffers:

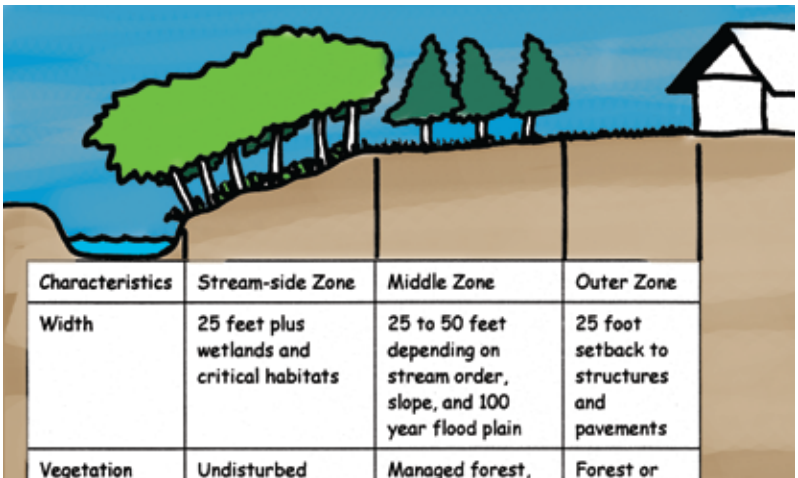
Buffers Benefit Wildlife, Water Quality, and You

Many property owners interested in supporting wildlife, protecting water quality, slowing stormwater, and/or stabilizing stream banks will purposefully leave strips of land along rivers, streams, or drainage ways in a natural condition. These strips of undeveloped, forested and shrubby land are called stream-side buffers (they may also be called riparian buffers, stream-side management zones, or filter strips). The term "buffer" refers to something that protects or reduces impacts.

We need and encourage property owners and developers to retain stream-side buffers because they serve us all in several ways. Consider the following benefits of stream-side buffers.

Benefits of stream-side buffers:

- **Provide wildlife habitat.** Trees and shrubs in buffers provide food, shelter, and structure that support a variety of insects, animals, and plants, both in the stream and on land.
- **Improve water quality.** Buffers trap and remove sediment, nutrients, and other pollutants that are washed from upland areas to the stream. Trees in the buffer shade the stream, providing cooler water temperatures that benefit aquatic life. Note: Some of the greatest water quality benefits come from buffering the smallest streams, those you can jump across.
- **Reduce streambank erosion.** The tree roots in buffers will consolidate and hold the soils of the bank and floodplain, reducing the potential for severe bank erosion.
- **Provide effective flood control.** Buffers that include floodplains store and slow-down flood waters and thereby reduce damage to downstream properties. Expensive flood controls, such as levees, are not necessary when buffers include the 100-year floodplain.
- **Increase property values.** Many homebuyers are attracted to the amenities of undeveloped, natural areas (such as stream buffers) in their communities.
- **Reduce maintenance costs.** Landowners can save the significant costs of mowing and maintenance when open lands are managed as vegetated buffers rather than turf grasses.



Characteristics	Stream-side Zone	Middle Zone	Outer Zone
Width	25 feet plus wetlands and critical habitats	25 to 50 feet depending on stream order, slope, and 100 year flood plain	25 foot setback to structures and pavements
Vegetation	Undisturbed forest, reforest if grass	Managed forest, with some timber harvest	Forest or turf
Uses	Very limited: flood control, footpaths, utility right of ways	Limited: some recreational use, selected tree removal	Not limited: lawns, gardens

Stream-side buffer concept depicting three zones with different characteristics and uses designed to protect water quality and wildlife habitats. (Graphic adapted from The Practice of Watershed Protection. 2000. Produced by the Center for Watershed Protection)

Let your stream-side land go natural. Forested, shrubby buffers along streams will support more wildlife and help protect streams from polluted runoff and rushing stormwater that flows from development areas. (Graphic from University of Wisconsin Extension and Wisconsin DNR)

- **Decrease public investment needs.** By reducing floods, erosion, and polluted runoff, buffers can minimize public costs of stormwater management systems and water quality restoration projects.
- **Enhance recreation.** Stream buffers can be designed to provide recreational opportunities for communities by connecting open spaces, creating linear parks, and providing trails to serve walkers, runners, and bikers.

The size, or width, of a stream-side buffer will vary depending on the interests of the landowner and the size of the stream. Suggestions for stream-side buffer widths can range from 40 to 300 feet; the larger the buffer, the greater the natural benefits.

What size buffer to consider:

- **40-100 feet: water quality buffer.** For water quality protection, a minimum buffer width of 40 to 100 feet (dependent on slope) is recommended on both sides of the stream. Steeper slopes need larger buffers.
- **100-300 feet: wildlife habitat buffer.** For conserving and enhancing wildlife habitat, and to better enhance water quality, it is recommended that a buffer measuring 100 to 300 feet be established. The wider the buffer, the greater the benefits for wildlife and clean water. Ideally, the buffer should include the natural floodplain and adjacent uplands.

Make Habitat Connections:

Stream Buffers, a Key to Linking Habitats for Wildlife

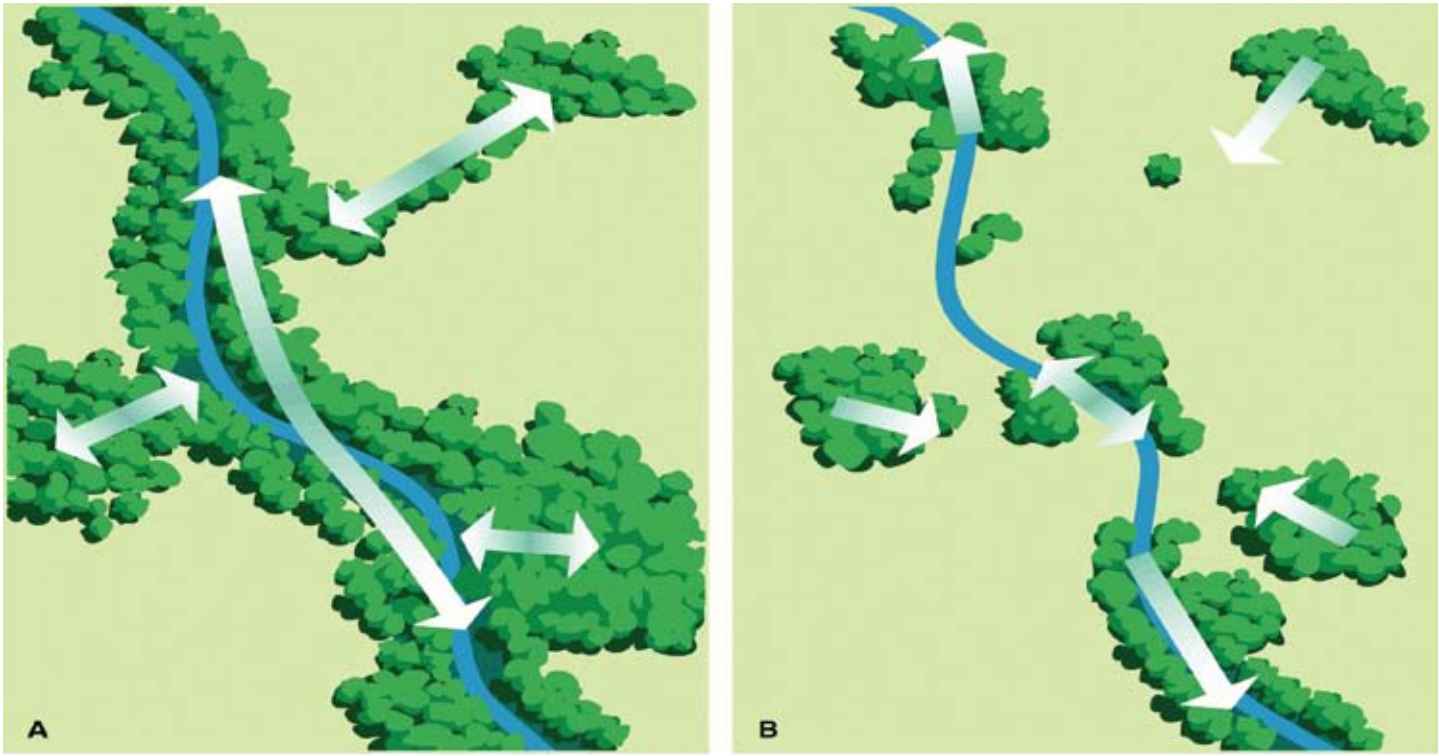
An important way to improve wildlife habitat is to expand the available habitat area. In developing communities, where habitat is usually shrinking, an important approach to optimize the available habitat area is to enhance the connections (or linkages) among habitats and avoid further fragmentation (or isolation) of habitats. Maintaining or restoring habitat connections provides for a larger contiguous area of habitat that can better support some sensitive species and provide travel corridors needed for wildlife movement.

Streams promote habitat connections. Because streams branch out into all communities they present opportunities to keep or improve habitat connections. The isolated wood lots, stands of trees, and other undeveloped areas can be connected (linked together) with stream corridors and become part of a larger "network" of habitat for wildlife.

Habitat connections can be made on individual pieces of property, among many neighboring properties or, best of all, throughout an entire county or watershed.

Developers and landowners can improve habitat connections:

- **Design sites to include more habitat area.** Developers can design their projects to keep more habitat area on the site and keep habitat connections both within their site and with neighboring properties, particularly where a stream or drainage corridor is shared. Buyers of real-estate can seek out developments where the master plan and design conserves more habitat including buffers on streams.
- **Allow more area to go wild.** Landowners may be able to link wooded lots and natural areas with a neighboring stream corridor by letting more areas grow wild. For example, not cutting or mowing an area between two wooded areas could allow a wildlife corridor (a habitat connection) to be established.
- **Commit to keeping and expanding buffers along streams.** Establish buffers along streams and drainage ways and encourage neighboring landowners to do the same. Together, a community of landowners can improve habitat connections by establishing a continuous, unbroken buffer running the length of a stream and throughout a watershed.
- **Use conservation easements to make land protection permanent (with tax benefits).** Landowners interested in protecting the natural and cultural value of their land should learn about the tax advantages of conservation easements. These flexible deed restrictions, while protecting land from development, can also shelter the family from estate taxes and property taxes and allow continued use of the land within specified limitations. Land trust organizations and qualified estate planners can help you explore options related to conservation easements.



Habitat connections in stream corridors: (A) good connections (B) poor connections. Stream corridors provide opportunity to improve wildlife habitat quality (and protect water quality) by conserving continuous stream-side buffers (as depicted in A) and linking buffers outward to nearby upland habitats. (Graphic from Stream Corridor Restoration: Principles, Processes, and Practices. 1998. Produced by 15 federal agencies of the US)

The Choice is Up to You:

The golden rule asks us to consider how our actions will affect other people. How will our dumping, spraying, clearing, building, or paving impact folks downstream, downwind, or within view of us? And what about those downstream from us in time -- our stewardship of the earth directly affects the generations that follow us.

So consider your actions and make good choices. Use this information and other sources and begin making a positive difference in the protection of stream habitats and water quality in your community today.

Contacts and Information Sources:

Center for Watershed Protection: Ellicott City, MD; (410) 461-8323. Information on stormwater and urban watershed management. Publication: The Practice of Watershed Protection. Website: The Stormwater Managers Resource Center: www.stormwatercenter.net

Clemson University Cooperative Extension Service: Clemson, SC; (803) 656-3382. Publication: South Carolina Home-A-Syst: Home Assessment System for Water Quality Protection. (Coastal residents, ask for Coast-A-Syst.) Website: www.clemson.edu/extension

Land Trusts: About 20 land-trust organizations exist in South Carolina. Examples include: Congaree LT, Columbia (803) 988-0000; Lowcountry Open LT, Charleston; (843) 577-6510; Upstate Forever, Greenville (864) 250-0500. The Land Trust Alliance, a national organization, provides information on land trusts and conservation easements at its website: www.lta.org

Low Impact Development, Inc.: Beltsville, Maryland; (301) 982-5559. Information about land planning and engineering design. Website: www.lowimpactdevelopment.org Urban Design Tools website: www.lid-stormwater.net

S.C. Department of Health and Environmental Control (DHEC): Columbia, SC; (803) 898-4300. Information on environmental permitting, the regulation and control of pollution, and water resource

use. Publications: (1) Turning the Tide: A Citizen's Guide to Reducing Nonpoint Source Pollution. (2) Final Report of the Statewide Task Force on Riparian Forest Buffers.Website: www.scdhec.net/water

SCDHEC – Office of Ocean and Coastal Resource Management: Charleston, SC; (843) 744-5838. Information on environmental permitting for construction in coastal waters, wetlands, and beaches. Publications: (1) Vegetated Riparian Buffers and Buffer Ordinances. (2) Backyard Buffers for the South Carolina Lowcountry. Website: www.scdhec.net/ocrm

S.C. Department of Natural Resources (DNR): Columbia, SC; (803) 734-9100. Information on wildlife, fisheries, marine, land, and water resources, hunting and fishing, boating, scenic rivers, land conservation, geology, climate and drought, flood mitigation, and aquatic nuisance species. Website: www.dnr.sc.gov

S.C. Forestry Commission: Columbia, SC; (803) 896-8800. Information on forest management and stream-side management zones. Publication: South Carolina's Best Management Practices for Forestry. Website: www.state.sc.us/forest

S.C. Sea Grant Consortium: Charleston, SC; (843) 953-2078. Information on coastal resource management and research (and NEMO for SC). Publication: South Carolina Coast-A-Syst: Environmental Risk Assessment System for Protecting Coastal Water Quality. Website: www.scseagrant.org

S.C. Wildlife Federation: Columbia, SC; (803) 256-0670. Website: www.scwf.org See Backyard Wildlife Habitat program.

Stream Corridor Restoration: Principles, Processes, and Practices. Information from the Federal Interagency Stream Corridor Restoration Group. Website: www.nrcs.usda.gov/Technical/stream_restoration

U.S.D.A. Natural Resource Conservation Service: Columbia, SC; (803) 253-3935. Information and assistance on agriculture practices and various conservation incentive programs. Website: www.sc.nrcs.usda.gov

NEMO: Nonpoint Education for Municipal Officials Project. Information and educational assistance linking land use to water quality. Website (national): nemo.uconn.edu/ Website (SC): www.scseagrant.org/scnemo/

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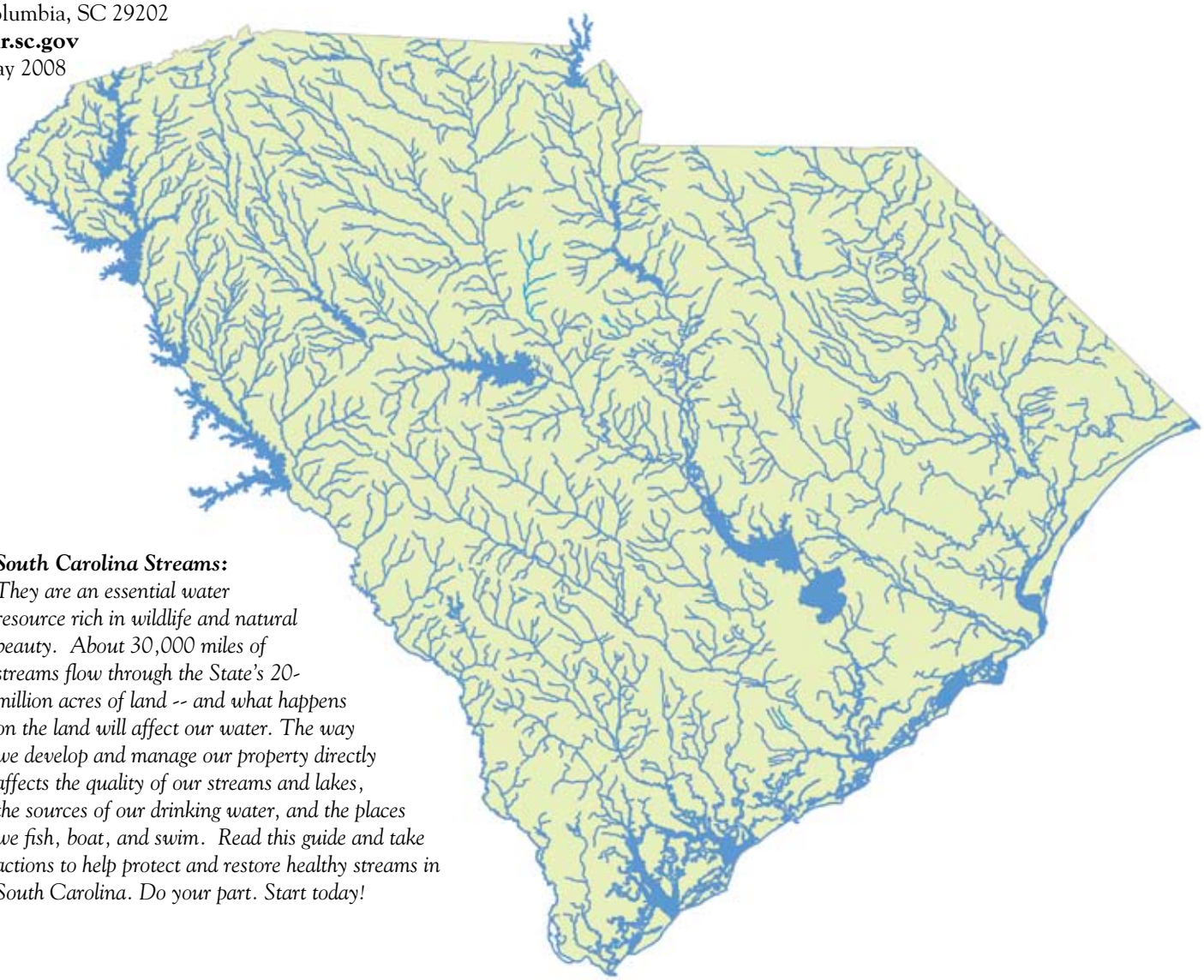

South Carolina Streams:
They are an essential water resource rich in wildlife and natural beauty. About 30,000 miles of streams flow through the State's 20-million acres of land -- and what happens on the land will affect our water. The way we develop and manage our property directly affects the quality of our streams and lakes, the sources of our drinking water, and the places we fish, boat, and swim. Read this guide and take actions to help protect and restore healthy streams in South Carolina. Do your part. Start today!

The South Carolina Department of Natural Resources' mission is to serve as the principle advocate for and steward of South Carolina's natural resources. You can learn more about the DNR at www.dnr.sc.gov.

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